

Remarks

The principle document which the Examiner relies upon is a patent of Pressa et al. (US Patent No. 4,876,218) which teaches a method of growing GaAs films on silicon substrates, for example. According to the '218 patent, the GaAs layer is built one atomic layer at a time by first putting down a layer one atom thick of As atoms followed by a one atom thick layer of Ga atoms. Then this process of putting down a one atom layer thick layer of As followed by a one atom thick layer of Ga is repeated many times until the desired buffer layer thickness is obtained. See, for example, column 3, lines 39-64.

Before getting into the Examiner's analysis of the '218 patent vis-a-vis claim 1, now would be an apropos time to look at the specific limitations of claim 1 which is set forth below:

"A method of epitaxially growing a second crystal over a first crystal, the first crystal having a first lattice constant, the second crystal having a second lattice constant, the method comprising the steps of:

- a) cleansing a surface of the first crystal by thermal desorption;
- b) depositing a first layer of a first material over the surface of the first crystal;
- c) depositing a second layer of a second material over the first layer; and
- d) epitaxially growing the second crystal over the second layer;

wherein the first layer substantially accommodates strain accumulated between the first crystal and the second crystal during epitaxial growth, thereby substantially preventing strain relaxation and formation of dislocation defects."

Step (b) of claim 1 recites depositing a first layer of a first material over the surface of the first crystal and step (c) recites depositing a second layer of a second material over the first layer. The Examiner attempts to read the recited first layer on the first layer of the '218 patent which is a one atom thick layer of As atoms. The Examiner reads the recited second layer on the disclosure in the '218 patent of the one atom thick layer of Ga atoms which are placed upon the one atom thick layer of As atoms.

Step (d) of claim 1 recites "epitaxially growing the second crystal over the second layer" and claim 1 also recites "wherein the first layer substantially accommodates strain accumulated between the first crystal and the second crystal during epitaxial growth..." In an attempt to read the '218 patent on Applicant's claims, the Examiner takes an incredible position. The Examiner asserts that the first layer, namely the one atom thick layer of As meets the limitation of "wherein the first layer substantially accommodates strain accumulated between the first crystal and the second crystal during epitaxial growth..."

As indicated above, there are many individual As and Ga layers which are laid down one atom layer thickness at a time. Please read column 3, lines 60-64 of the '218 patent. The entire thickness of this GaAs buffer is at least 40-50 Angstroms and preferably at least 500 Angstroms! See column 2, lines 43-51. Such thicknesses require many individual one atom thick layers to be sandwiched together in order to form such a thickness of material.

The bottom line is that the '218 patent teaches a person of ordinary skill in the art that it takes many individual layers of As and Ga to be put down one atom thickness at a time coming to a total thickness of preferably at least 500 Angstroms and when you get to that thickness, you apparently get strain accommodation as mentioned at column 2, lines 25-43. To a person skilled in the art reading the '218 patent, they are essentially told to use many interleaved Ga and As one atom thick layers in order to obtain strain relief. It is submitted that the implication that a person of ordinary skill in the art would draw from this is that the strain relief is distributed over all of the layers. As such, how can the Examiner possibly assert that the first one atom thick layer of As atoms disclosed in the '218 patent meets the limitation "wherein the first layer substantially accommodates strain accumulated between the first and second crystal during epitaxial growth..."? That means that the position that the Examiner is taking based upon the '218 patent is that a one atom thick layer substantially accommodates the strain accumulated between the first crystal and the second crystal during epitaxial growth whereas the remaining layers accommodate essentially no strain accumulated between the first crystal and the second crystal during epitaxial growth! Since the position being

taken by the Examiner is believed to fly in the face of conventional motions of physics, and since the position taken by the Examiner is not based upon anything disclosed in the '218 patent, the Applicant must conclude that the Examiner is relying upon facts within his own personal knowledge in taking the position he has in the final rejection. As such, the Examiner is respectfully requested to comply with the rules of practice, particularly 37 C.F.R. 1.104(d)(2) and supply the Affidavit specifically setting forth the facts upon which he relies in rejecting claim 1.

The Examiner was advised in a telephone call with the undersigned that Applicant would be making the request set forth above. The Examiner advised that he would have to consult with his superior at the USPTO. The Examiner later advised, via the undersigned's secretary, that the Examiner would not supply the affidavit required by the rules of practice and that it was, in essence, up to the Applicant to disprove the position being taken by the Examiner.

The Applicant regards this action as being a serious violation of the rules of practice since the office is attempting to shift the burden of examining this application to the Applicant. The rules of practice do not contemplate that the Examiner can simply say "The invention is obvious and if you disagree, prove me wrong". But that is what the Examiner is, in essence, trying to do here by making unsupported (and in this case unsupportable) factual assertions. As such, the Group Director is respectfully requested to telephone the undersigned to discuss this particular issue.

With all due respect to the Examiner, the Examiner simply does not have a proper understanding of strain relief in crystalline materials. The Examiner's assertion, in essence, that in a 500 monolayer crystal the strain relief would occur in a first, single monolayer violates well understood principles of physics, in particular:

(1) the strain relief is believed to occur uniformly if the thickness is greater than the so-called "Matthews Blakeslee critical thickness"; and

(2) if the thickness is under the Matthews-Blakeslee critical thickness, then strain relief occurs with dislocations.

Note that claim 1 specifically recites that "the first layer substantially accommodates strain accumulated between the first crystal and the second crystal during epitaxial growth, thereby substantially preventing strain relaxation and formation of dislocation defects."

Enclosed is a copy of a very well known paper on this subject: "Defects in Epitaxial Multilayers" by Matthews and Blakeslee. The office should require all Examiners in this art area to understand this document. Also, doing an search on the Internet for "Matthews Blakeslee critical thickness" would also provide the examining staff with useful information in this area of technology.

Claim 6 has been amended as indicated above, to delete the superfluous word "into" from step (b1) and to change the closing semicolon to a period. These amendments do not affect the scope of claims 6.

Claim 6 recites, among other things, "adjusting a thickness of the first layer by varying a temperature of the first crystal." The Examiner discusses claim 6 on page 4 of the official action, but, unfortunately, it is not at all clear why the Examiner is rejecting claim 6 based upon the two patents mentioned above. The '218 patent makes it crystal clear that the thickness of the first layer is 1 atom. How can that read upon adjusting the thickness by varying the temperature of the first crystal as asserted by the Examiner in the official action? It is true that in the '218 patent that many layers are laid down, one atom thickness at a time, but it is only the first layer to which the Examiner makes reference in reading the limitation of paragraph (b) of claim 1 on the '218 patent. The Examiner cannot now in his analysis of claim 6 take a different position by trying to read the recited first layer upon multiple layers. Moreover, where is there even a scintilla of a suggestion in the '218 patent of "adjusting the thickness by varying a temperature of the first crystal" as asserted by the Examiner? If anything, the '218 patent teaches just the opposite. That is, that the thickness of the first layer is not varied at all!

It is clear that the prior art cited by the Examiner fails to meet each and every limitation

of either claim 1 or any of its dependent claims. Indeed, it is submitted, that instead of concentrating the strain relief in a single layer one atom thick, that the strain would be relieved uniformly over many layers (assuming no dislocation occurs). See the Matthews & Blakeslee publication noted above.

Reconsideration of the final rejection is respectfully requested.

The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 12-0415. In particular, if this response is not timely filed, then the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136 (a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 12-0415.

I hereby certify that this correspondence is being deposited with the United States Post Office with sufficient postage as first class mail in an envelope addressed to Commissioner for Patents

POB 1450, Alexandria, VA 22313-1450 on

August 25, 2003

(Date of Deposit)

Corinda Humphrey

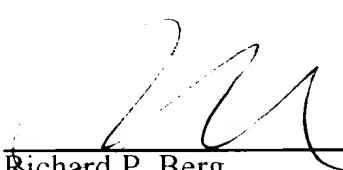
(Name of Person Signing)

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August 25, 2003

(Date)

Respectfully submitted,


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